ATTACHMENT - CLAIMS LISTING

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (previously presented) A mechanical oscillator system for a horological mechanism or other precision instrument, the system comprising

a non-magnetic ceramic balance and

a non-magnetic balance spring formed of a composite material or a polymer, carbon or ceramic material,

wherein the balance and balance spring are adapted such that the coefficient of thermal expansion of the balance (α_1), the coefficient of thermal expansion of the balance spring (α_2) and the thermoelastic coefficient of the balance spring ($\partial E/E$) cooperate to compensate for thermal variation in the system.

2. (original) A system according to claim 1, wherein the material of the balance spring is a composite material having a matrix phase comprising polymer, carbon or ceramic.

3. (previously presented) A system according to claim 1, wherein the balance spring material comprises continuous fibres extending along the length of the balance spring from one end of said spring to the other end of said spring.

4. (original) A system according to claim 3, wherein said continuous fibres are carbon fibres.

5. (cancelled)

6. (previously presented) A system according to claim 3, wherein the fibres are produced from one of the precursors 'PITCH' or polyacrilonitrile 'PAN'.

7-8. (cancelled)

9. (previously presented) A system according to claim 1, wherein the material of the balance spring is a composite material having a coefficient of thermal expansion in the

direction along the length of the balance spring which is negative and exhibits linear thermal variation up to 700° Kelvin.

10. (previously presented) A system according to claim 1, wherein the damping of the modulus of elasticity of the balance spring is of the order of 0.001 Pa.

11. (previously presented) A system according to claim 1, wherein the balance spring material comprises ceramic fibres.

12. (original) A system according to claim 11, wherein said ceramic fibres have a coefficient of thermal expansion whose magnitude is less than 6×10^{-6} K^{-1}.

13. (previously presented) A system according to claim 3, wherein said fibres are substantially parallel to each other.

14. (previously presented) A system according to claim 3, wherein said fibres are twisted together.

15. (previously presented) A system according to claim 1, wherein the balance spring is a flexion spring configured to work in flexion to oscillate the balance.

16. (previously presented) A system according to claim 1, wherein the density of the balance spring material is less then $3g/cm^3$.

17. (previously presented) A system according to claim 1, wherein the balance is formed by high precision injection moulding.

18. (previously presented) A system according to claim 1, wherein the material of the balance spring has a negative thermoelastic coefficient.

19. (previously presented) A system according to claim 1, wherein the balance spring is of flat spiral or helicoidal form, and the coefficient of thermal expansion of the balance spring in a direction along its length and the coefficient of thermal expansion of the balance are of opposite signs and of similar orders of magnitude.

20. (previously presented) A system according to claim 19, wherein the coefficient of thermal expansion of the balance is positive and the coefficient of thermal expansion of the material of the balance spring in the direction along the length of the balance spring is negative.

21. (previously presented) A system according to claim 20, wherein the thermal coefficient of expansion of the balance is less than 1×10^{-6} K^{-1} and the coefficient of thermal expansion of the material of the balance spring in the direction along the length of the balance spring is greater than -1×10^{-6} K^{-1}.

22. (previously presented) A system according to claim 1, wherein the respective magnitudes and thermal variations of the coefficient of thermal expansion of the material of the balance (α_1), the coefficient of thermal expansion of the material of the balance spring (α_2) and the thermoelastic coefficient of the material of the balance spring ($\partial E/E$) are selected such that, for thermal variation within a predetermined temperature range, the variation (U) in timekeeping changes for the system is minimized, where

$$U = \alpha_1 - \frac{3}{2}\alpha_2 - \frac{1}{2}\frac{\partial E}{E} .$$

23. (currently amended) A non-magnetic balance spring for oscillating a balance in an oscillator mechanism for a horological instrument, the balance spring formed from a composite material or a polymer, carbon or ceramic material,

wherein the balance spring material has a coefficient of thermal expansion (α_2) and a thermoelastic coefficient ($\partial E/E$) arranged to cooperate with a coefficient of thermal expansion of the balance (α_1)<u>, by decreasing in length and increasing in thickness with increase in temperature</u> to compensate for thermal variation in the system.